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10/768,237	01/30/2004	William Richard Victor Edwards	148/373A	6202
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ADAMS EVANS P.A. Suite 2350 Charlotte Plaza 201 South College Street CHARLOTTE, NC 28244			EXAMINER DAY, HERNG DER	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/768,237

Applicant(s)

EDWARDS ET AL.

Examiner

Herng-der Day

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1/30/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. Claims 1-24 have been examined and rejected.

#### *Specification*

2. The disclosure is objected to because of the following informalities. Appropriate correction is required.
  - 2-1. It appears that “parallepped”, as described at line 7 of page 4, lines 9 and 14 of page 7, and line 18 of page 13, should be “parallepped”.
  - 2-2. Fig. 9a should be included in BRIEF DESCRIPTION OF THE DRAWINGS.

#### *Claim Objections*

3. Claims 6, 7, 11, and 23 are objected to because of the following informalities. Appropriate correction is required.
  - 3-1. Claim 6 recites the limitation “as claimed in claim I” in line 1 of the claim (Emphasis added). “I” should be changed to “1”.
  - 3-2. Claim 7 recites the limitation “within the swept volume 25 of that tool movement” in line 3 of the claim (Emphasis added). “25” should be deleted.
  - 3-3. Claim 11 recites the limitation “as claimed in claim I0” in line 1 of the claim (Emphasis added). “I0” should be changed to “10”.
  - 3-4. Claim 23 recites the limitation “arranged to perform to perform the steps” in line 2 of the claim (Emphasis added).

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5-1. The term “substantially equally sized” in claim 4 is a relative term which renders the claim indefinite. The term “a plurality of substantially equally sized regular three-dimensional volumes” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Claim 5 is rejected as being dependent on the rejected claim 4.

***Claim Rejections - 35 USC § 101***

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 1-12, 14-15, and 17-22 are rejected under 35 U.S.C. 101 because the inventions as disclosed in claims are directed to non-statutory subject matter.

7-1. Claims 1-12, 14-15, and 17-22 are directed to machining simulation. This claimed subject matter lacks a practical application of a judicial exception (law of nature, abstract idea,

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naturally occurring article/phenomenon) since it fails to produce a useful, concrete, and tangible result.

Specifically, the claimed subject matter does not produce a tangible result because the claimed subject matter fails to produce a result that is limited to having real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or manipulated data. More specifically, the claimed subject matter provides for determining regular volumes coincident with swept volumes and applying pointers. This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value.

7-2. The Examiner acknowledges that even though the claims are presently considered non-statutory they are additionally rejected below over the prior art. The Examiner assumes the Applicant will amend the claims to overcome the 101 rejections and thus make the claims statutory.

### ***Double Patenting***

8. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

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A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

9. Claims 1, 6, 7, and 12 are rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1 of prior U.S. Patent No. 6,862,560 B1. This is a double patenting rejection.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-11 and 13-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oliver et al., U.S. Patent 5,710,709 issued January 20, 1998, in view of Maeda, U.S. Patent 5,317,519 issued May 21, 1994 (IDS reference AA, filed January 30, 2004), and further in view of Suzuki, U.S. Patent 5,272,642 issued December 21, 1993.

11-1. Regarding claim 1, Oliver et al. disclose a method for machining simulation (NC simulation, column 3, lines 42-67), comprising the steps of:

(a) determining a plurality of regular volumes containing surfaces of an object representing a raw stock (dixel representation, column 4, lines 58-67);

Oliver et al. fail to expressly disclose (b) determining a subset of said plurality of regular volumes coincident with a swept volume representing a tool movement. Nevertheless, Oliver et

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al. suggest that “only those portions of the milled surface which are modified during a particular tool motion are changed” (column 9, lines 5-7).

Maeda discloses a machining simulation system (Maeda, column 2, lines 19-51) including cross-section display circuits for generating video signals. “A three-dimensional shape change circuit 22 serves to change material shape when the tool shape is intruded in the material shape by scanning the three-dimensional shape memory 11 and the three-dimensional pattern memory 21 as well” (Maeda, column 8, lines 59-63). With the help of various cross-section displays, a subset of said plurality of regular volumes coincident with a swept volume representing a tool movement can be easily determined. Furthermore, a change of the material shape can be speeded up irrespective of the CPU processing capability due to the shape change circuit (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Oliver et al. to incorporate the teachings of Maeda to obtain the invention as specified in step (b) of claim 1 because with Maeda’s machining simulation system, the animation picture process can be speeded up irrespective of the capability of a CPU (Maeda, column 2, lines 41-46).

Oliver et al. also fail to expressly disclose (c) applying a pointer to each said regular volume of said subset, said pointer referring to said tool movement.

Suzuki discloses a hierarchical data structure for CAD/CAM device (Suzuki, column 2, line 10, through column 3, line 9) with a layer table tabulating the layers each including the attributes for the layer and the other-layers referencing information for other layers. By means of the links provided by the other-layers referencing information, all the information necessary for

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the generation of the NC data is obtained (Suzuki, column 6, line 60, through column 7, line 7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined teachings of Oliver et al. and Maeda to incorporate the teachings of Suzuki to obtain the invention as specified in claim 1 because Suzuki suggests the hierarchical data structure invention be realized as a function of an automatic programming device included within a numerically controlled device (Suzuki, column 7, lines 40-45).

**11-2.** Regarding claim 2, Oliver et al. further disclose the step:

(d) repeating the steps (b) and (c) for each tool movement of a predetermined plurality of tool movements (the next sequential tool positioned is processed, column 10, line 66, through column 11, line 1).

**11-3.** Regarding claim 3, Oliver et al. further disclose the step (a) comprises the steps of:

(a1) receiving 3D object data representing a raw stock (provide data for workpiece 52, Fig. 13); and

(a2) transforming the 3D object data to produce a transformed 3D object dataset including a plurality of regular volumes each containing a reference to at least one surface of the raw stock (determine dixel representation of workpiece 54, Fig. 13).

**11-4.** Regarding claim 4, Oliver et al. further disclose the transforming step (a2) comprises segmenting the object into a plurality of regular three-dimensional volumes such that the or each surface of the object falls within the total volume defined by the plurality of regular volumes (determine dixel representation of workpiece 54, Fig. 13).

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**11-5.** Regarding claim 5, Suzuki further discloses each regular volume contains a stock object pointer referring to a plane equation describing the surface of the original raw stock falling within that regular volume (Suzuki, three-dimensional form layer, column 2, lines 16-31).

**11-6.** Regarding claim 6, Oliver et al. further disclose the step (b) comprises:

(b1) determining a swept volume for the tool movement in a co-ordinate space common to both the swept volume and the plurality of regular volumes (tool swept volume, column 7, lines 53-56);

**11-7.** Regarding claims 7-8, Oliver et al. fail to expressly disclose the step (b) comprises steps (b2) determining a subset of the plurality of regular volumes wholly or partially within the swept volume of that tool movement; (b21) determining those regular volumes of the subset which are wholly within the swept volume; and (b22) determining those regular volumes of the subset which are partially within the swept volume and thereby coincident with a surface of the swept volume.

Maeda discloses a machining simulation system (Maeda, column 2, lines 19-51) including cross-section display circuits for generating video signals. "A three-dimensional shape change circuit 22 serves to change material shape when the tool shape is intruded in the material shape by scanning the three-dimensional shape memory 11 and the three-dimensional pattern memory 21 as well" (Maeda, column 8, lines 59-63). With the help of various cross-section display, regular volumes wholly or partially within the swept volume of the tool movement can be easily determined. Furthermore, a change of the material shape can be speeded up irrespective of the CPU processing capability due to the shape change circuit (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Oliver et al. to incorporate the teachings of Maeda to obtain the invention as specified in claims 7 and 8 because with Maeda's machining simulation system, the animation picture process can be speeded up irrespective of the capability of a CPU (Maeda, column 2, lines 41-46).

**11-8.** Regarding claim 9, Suzuki further discloses the step (c) comprises attaching a tool movement pointer to each of said subset of regular volumes, the tool movement pointer referring to the tool movement (Suzuki, work layer, column 2, lines 37-42).

**11-9.** Regarding claim 10, Suzuki further discloses the tool movement pointer refers to a surface of the swept volume of the tool movement coincident with that regular volume (form layers, column 2, lines 37-42).

**11-10.** Regarding claim 11, Suzuki further discloses the tool movement pointer refers to a plane equation representing the surface of the swept volume of the tool movement (form layers, column 2, lines 37-42).

**11-11.** Regarding claim 13, Oliver et al. further disclose the step:

(e) displaying a 3D object comprising the plurality of regular volumes on a human visible display (CRT output 40, Fig. 12A).

**11-12.** Regarding claim 14, Oliver et al. further disclose the step:

(f) for each of selected regular volumes from the plurality of regular volumes, determining a fully realized finished surface by combining the surface of the raw stock contained within that regular volume with the or each tool movement referred to by the tool movement pointer applied to that regular volume (simulation algorithm, column 7, lines 43-52).

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**11-13.** Regarding claim 15, Oliver et al. further disclose the step (f) results in a fully realized surface geometry representation with full boundary information as a final 3D object dataset (simulation algorithm, column 7, lines 43-52).

**11-14.** Regarding claim 16, Oliver et al. further disclose the step (f) comprises displaying the final 3D object dataset on a human visible display (CRT output 40, Fig. 12A).

**11-15.** Regarding claim 17, Oliver et al. further disclose the plurality of regular volumes form a list, each regular volume comprising a position field, a surface pointer field, a next type field and a next regular volume pointer (dixel data type, column 6, lines 10-18).

**11-16.** Regarding claim 18, Suzuki further discloses the surface pointer field of each regular volume comprises an original stock surface pointer or one or more tool surface pointers (Suzuki, layer no. 16, FIG. 2).

**11-17.** Regarding claim 19, Oliver et al. further disclose step (a) comprises transforming an input 3D object data representing a raw stock to produce a transformed 3D object dataset, including the steps of:

1) applying an XYZ grid at a predetermined orientation with respect to the stock object ( $I_1I_2I_3$ , FIG.2);

2) for an XY cell of said XYZ grid, determining a surface boundary of the stock object in the Z direction (depth vector, column 5, lines 7-8); and

3) determining regular grid values in the Z direction to give a parallelepiped volume having maximum and minimum Z values containing the surface boundary of the stock object (NEAR\_Z and FAR\_Z, FIG.2).

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**11-18.** Regarding claim 20, Oliver et al. further disclose the step of determining a next type identifier with reference to a surface orientation of the surface boundary surface outward normal vectors, column 6, lines 3-7).

**11-19.** Regarding claim 21, Oliver et al. further disclose the next type identifier is selected to represent void (null, column 6, lines 24-25).

**11-20.** Regarding claim 22, Oliver et al. further disclose the next type identifier is selected to be one amongst adjacent, solid or void (null, column 6, lines 24-25).

**11-21.** Claim 23 is an apparatus claim including same method limitations as in claim 1 and is unpatentable using the same analysis of claim 1.

**11-22.** Claim 24 is a medium claim including same method limitations as in claim 1 and is unpatentable using the same analysis of claim 1.

### ***Allowable Subject Matter***

**12.** Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

**13.** The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

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Reference to Tangelder et al., "Solid Model Representations for Rapid Prototyping with a Milling Robot", Proceedings on the Second ACM Symposium on Solid Modeling and Applications, 1993, pages 495-496, is cited as disclosing 6-grid voxel data structure.

14. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Heng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kamini S. Shah can be reached on (571) 272-2279. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Heng-der Day  
October 12, 2007 *H.D.*

  
KAMINI SHAH  
SUPERVISORY PATENT EXAMINER